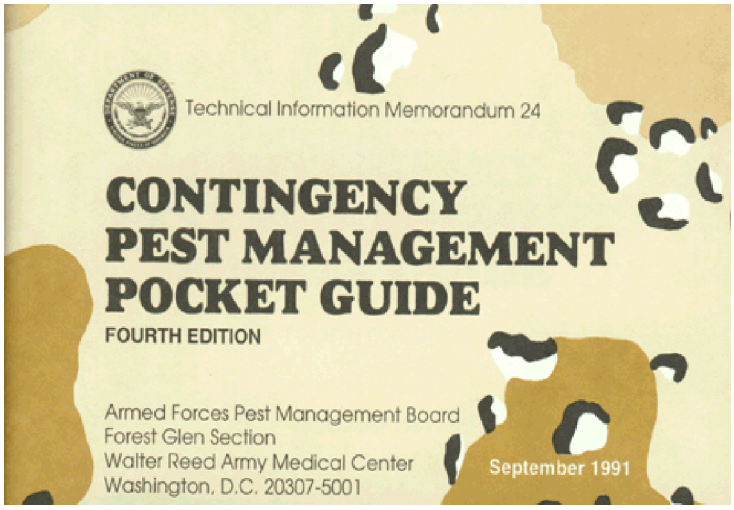

- NOTICE -

This Technical Information Memorandum is intended for field use during exercises and contingency operations by deployed Army, Navy, and Air Force preventive medicine/pest control personnel who have been formally trained and certified as Department of Defense Certified Applicators of Restricted Use Pesticides in accordance with DoDD 4150.7-M, and who have the primary mission of controlling disease vectors and pests that affect military operations. Other personnel should not attempt to procure or use pesticides or equipment listed herein unless specifically authorized by Service regulations.

ACKNOWLEDGMENTS

Acknowledgment is made to the staff, especially LT Cole Church, of the US Navy Disease Vector Ecology and Control Center, Alameda, CA, for providing the first working draft of this guide and to Major Edmund Davis, Contingency Liaison Officer of the Armed Forces Pest Management Board (AFPMB), for nurturing the document from that point to its published form. Thanks are also due to the many AFPMB representatives who volunteered their time and expertise to provide valuable comments and suggested improvements during preparation of the Pocket Guide. Special thanks are given to the enlisted Army, Navy, and Air Force pest controllers/preventive medicine technicians and specialists who reviewed and evaluated the Pocket Guide from the standpoint of its potential value to them during military exercises and actual contingency operations outside the United States.

DISCLAIMER

This Technical Information Memorandum (TIM) does not serve as the official authority for procuring or using pesticides or equipment listed herein. Trade names are used solely for the

purpose of providing specific information and do not imply endorsement of the product named or criticism of similar ones not mentioned. Mention of the trade names does not constitute a guarantee or a warranty of the product by the AFPMB, the military departments, or the Department of Defense.

TABLE OF CONTENTS

I. INTRODUCTION

A. Purpose and Content

The purpose of the **Contingency Pest Management Pocket Guide** is to provide basic guidance in using pesticides in field situation worldwide, during contingency operations or military exercises. This guide is a complement to, rather than a substitute for, the label instructions of specific pesticides listed herein. Sufficient information exists on vector/pest biology, nonchemical control methods, and vector/pest surveillance techniques, to preclude coverage in this manual. Hence, the Guide fills a void in the sources of vector/pest control information available to you, by providing a concise reference on: National Stock Number (NSN)-listed pesticides available through military supply channels and designated for contingency use by one or more of the Services; their uses, dosages, and application methods; pesticide dispersal equipment; personal protective equipment against disease vectors; how to air transport pesticides that do not meet transportation requirements; pesticide dilution and dosage formulas; and, U.S. military points of contact overseas who can provide information on vector-borne disease control in their respective areas of the world.

B. Applying Pesticides in Foreign Countries

In the U.S. and trust territories, the Environmental protection Agency (EPA)-approved pesticide **LABEL IS THE LAW**. But what rules do we use in areas outside the jurisdiction of the EPA? DoD Directive 4250.7, "DoD Pest Management Program", governs how we use pesticides in the military and it states: In foreign countries and in other areas outside EPA jurisdiction, pesticide application shall be in accordance with the accepted standards and procedures of the host country, or any host-tenant agreement between the U.S. and that country. If there are no such local standards or agreements, then you must adhere to EPA requirements, or your own Service regulations, **whichever are more stringent**. This means that, unless you can confirm otherwise, you should consider that the **LABEL IS THE LAW** wherever you are in the world. Predeployment planning should include determining the restrictions of pesticide use.

C. Controlling Pests Not Listed on Pesticide Labels

Whenever you are outside the U.S., you will likely encounter disease vectors not listed on your pesticide labels. Examples are: kissing bugs that transmit Chagas's disease in Central and South America; tsetse flies that transmit African sleeping sickness in areas on that continent; or, phlebotomine sand flies that transmit leishmaniasis and sand fly fever in many parts of the world. How do we identify the pesticides to use in controlling these vectors? First, find out from an entomologist or reference material **how and where** the vector lives during its life cycle. Then, determine the **life cycle stage(s) most suspectable to chemical control**. Finally, identify a pesticide labeled for controlling a familiar pest at the **same site or location** as the vector you want to control. **YOU MAY APPLY A PESTICIDE AGAINST**

A PEST NOT LISTED ON THE LABEL, SO LONG AS THE PESTICIDE COULD BE USED TO CONTROL A LABELED PEST AT THE SAME SITE. For example, nymph and adult kissing bugs in Central and South America hide during the day in cracks and crevices inside dwellings like thatched huts, and in woodpiles and debris outside. You know from experience that pests like cockroaches and spiders can be controlled at the same indoor sites with several pesticides, and that ants, scorpions, and spiders can be controlled at the same outdoor sites. Therefore, you could properly use pesticides labeled for the familiar pests, to control (using the labeled treatment methods) kissing bugs found at the same labeled sites. (Pesticide recommendations for cockroach control are included in Section III for this reason). When you cannot find exactly the same site on the label and have no further guidance, think it through and choose the pesticide labeled for use at the most comparable site against the most similar pest. You may occasionally make a mistake and perhaps experience a control failure or other problem with the pesticide you choose, but you should still be confident that you chose the best available pesticide and that the benefits of killing the pests outweighed the risk involved.

D. The Importance of Sanitation

Poor sanitation and improper waste disposal under wartime conditions greatly increase the disease vector potential of such common pests as filth flies and rodents. Even in mobile field situations these "camp followers" have historically amplified sanitation problems, often resulting in epidemics of diarrheal diseases that have caused many casualties. This threat is even greater in urban areas converted to temporary or semi-permanent military use, because our personnel will not be moving every day to a different, cleaner area. In this situation, even cockroaches may join other pests associated with poor sanitation in compounding the problem, especially in an around structures used for food storage, preparation and consumption, and buildings used as troop housing. All of these pests must be controlled, but only in conjunction with concurrent efforts to correct the sanitation problems which provide the pests food, breeding areas, and harborage. The troop unit commanders are responsible for field sanitation. But it is your responsibility to make them aware of the consequences of failing to correct the problems, to advise them about how to make improvements, and to make sure they know that controlling the pests includes establishing and maintaining good sanitation practices. You cannot do it yourself with pesticides alone.

E. Safety Requirements

A dangerous temptation in field training or combat situations is to relax the safety requirements. Some people think, "The rules don't apply here". Yielding to that temptation can cost your health and the health of those around you. **REGARDLESS OF THE SITUATION OR THE LOCATION, ALL SAFETY REQUIREMENTS ON THE LABEL MUST BE MET**. It does not take much planning to insure that where there are pesticides, application equipment, and applicator personnel, the proper protective equipment is also on hand. There is no excuse for forgetting to bring protective equipment or failing to

use it. Most pesticide poisoning incidents are due to a lack of personnel who think that safety requirements apply only to people with less experience, or to situations when there is "more time". The label precautions are there for a reason: to protect your health. You should never fail to use all the necessary protective equipment. Your supervisor should not let you apply pesticides without it. **WEAR IT ALL, EVERY TIME**.

F. Disposal of Pesticides and Containers

On military exercises or non-tactical contingency operations (e.g., disaster relief) in the U.S. or trust territories, you must follow EPA guidance and additional state/territorial regulations concerning disposal of pesticides, rinse water, and pesticide containers. On exercises and non-tactical contingencies outside EPA jurisdiction, you must dispose of pesticides, rinse water, and containers in accordance with accepted standards and procedures of the host country. If there are no such local standards or agreements, you must adhere to EPA requirements, or your own service regulations, **whichever are more stringent**.

When supporting tactical contingencies such as combat operations in hostile territory or allied countries, you should still adhere to the principles of safe disposal of pesticides, rinse water, and pesticide containers. Even in these situations, rinsing of spray equipment after use is important for keeping it operational as well as for reducing the pesticide exposure hazard between uses. Unused spray left in a sprayer even for a day or two can clog nozzles and deteriorate parts so the sprayer will not operate properly the next time you need it. To minimize disposal problems, mix only as much pesticide spray as you **know** you are going to use. It is usually much easier and safer to mix spray a second time, than it is to dispose of full-strength spray left over because you mixed too much. If possible take enough clean water to rinse the sprayer at the spray site. The equipment rinse water can then be released at the spray site.

Use common sense in disposing of empty pesticide containers during tactical contingencies. Rinsing empty pesticide containers and adding the rinse water to the sprayer as a diluent will minimize health and environmental hazards. Punch holes in the sides and bottoms of metal or plastic containers and bury them if time permits, preferably in a landfill or other designated area. Empty bags should also be buried or burned. To prevent troops in the field and local residents from using empty pesticide containers as cooking pots or water containers, **NEVER LEAVE EMPTY PESTICIDE CONTAINERS, OF ANY SIZE, IN REUSABLE CONDITION, EVEN IF THEY ARE BURIED**. Most pesticide labels include instructions and precautions for disposing of the container.

G. Controlling Biting Pests That Are Not Disease Vectors

Predeployment planning includes determining the disease vectors you will likely have to control in the area of operations. Be aware that biting pests that are not disease vectors can pose a significant health threat as well. Ants, Culicoides biting midges, black flies and non-

vector mosquitoes are among the pests that have caused many casualties during military exercises in the U.S. and abroad, and during actual contingency operations. The casualties were victims of secondary infections of insect bites. The greatest threat will be in tropical and subtropical areas where the warmth and moisture promote rapid growth of fungal and bacterial infections, especially in field situations, where there is little opportunity to keep clean and dry. Healing of these minor wounds is very slow in this environment, and is usually retarded further because scratching the itch continually reopens the bite site. Infectious organisms are often introduced during the process of scratching. So, even in areas relatively free of vector-borne diseases, plan on controlling biting pests, often present in tremendous numbers, that indirectly produce casualties from secondary infections.

H. Controlling Schistosomiasis

Schistosomiasis will be a threat in many tropical and subtropical regions where sanitation is poor. In some areas nearly all the human population is infected. Standing or moving water contaminated with feces or urine of infected individuals, contains eggs of the disease organism. Newly hatched forms enter intermediate host water snails. Free-swimming infective forms eventually emerge from the snails and penetrate the skin of human beings bathing or swimming in, or even crossing, infested waters. In areas where schistosomiasis is endemic, assume that all standing or moving water is infested, until proven otherwise.

Both the tropical weight and temperate weight Battle Dress Uniforms provide substantial, but not complete, protections from penetration by infective forms (assuming trousers are intact and tucked into the boots, and exposed skin does not contact water). Repellents do not prevent penetration of the skin, and there is no vaccine or preventive medication. The best method of prevention is to avoid contact with water that may be infested. When this is unavoidable, the most practical method of breaking the chain of infection is to eliminate the intermediate host water snails (molluscs) by treating water with Bayluscide® 25% emulsifiable concentrate in 100 lb. Drums, NSN 6840-12-308-4377. (This is a NATO stock number of Germany, the location of the only manufacturer and distributor.) Bayluscide® 25% EC is not EPA-registered since it has no uses in the U.S. It can be ordered by normal requisition, but only for delivery outside the U.S. Application rate is 4.4 to 6.5 LB. Per acre foot. Onsite delivery time will be about three months. In endemic areas, local/regional health officials, representatives of international health organizations, or nearby medical entomology points of contact (see Appendix D) may provide information on emergency local sources.

I. Use of Herbicides Outside the United States

The OCONUS use of herbicides by the U.S. military is greatly restricted during peacetime (including exercises) and during war or other armed contingencies. During peacetime, herbicides may be used OCONUS within U.S. bases, posts, or installations for control of vegetation. (Hereafter, bases and posts are included in the term “installations”.

The U.S.-controlled portions of foreign installations are considered U.S. installations.) During OCONUS exercises you may apply herbicides within existing U.S. installations to the extent that application is already authorized in the installation's current pest management plan. Coordination with and permission of the installation commander or designated representative are required prior to herbiciding.

Off base uses of herbicides (including the immediate outside perimeters of U.S. installation) during peacetime/exercises must be in accordance with host-country laws and agreements, EPA restrictions on the pesticide label, or Service regulations, **whichever are most stringent and restrictive**. Off base permanent facilities "on loan" to U.S. forces during exercises, and temporary areas in the field (e.g., a temporary aircraft landing strip, or a field support area set up in tents) are not considered U.S. installations, so peacetime use of herbicides in those areas must be in accordance with off base OCONUS herbicide requirements listed above. Peacetime use of herbicides within and around U.S. installations is under the authority of the commander of the applicable unified or specified command.

In combat contingencies short of declared war, herbicide use is under peacetime restrictions, above.

The United States has renounced first-use of herbicides in war **except** under regulations applicable to domestic use or for control of vegetation within U.S. installations or around the immediate perimeters. Only the President of the United States may authorize other wartime uses. **Under no circumstances will large area aerial application of herbicides be conducted in the combat theater without approval of the President**.

The local commander's decision to request the use of herbicides in wartime must be carefully considered, and should be based on the following requirements:

Application of herbicides is the safest, or most effective way to solve the problem;

Temporary facilities will not relocate before herbicides will serve their intended purpose;

Loss of vegetation will not degrade security of present or future operations (compromise the location of otherwise undetectable positions or troop movement subject to enemy ground or aerial surveillance);

The desired effect can be achieved with one of the designated contingency herbicides listed below. (Each herbicide is available by requisition to all Services.)

Glyphosates should be used whenever possible. Bromacil should used only when long-term control is clearly needed. Paraquat, a restricted-use pesticide, should be used only when the benefits of rapid control outweigh the health hazards to applicators and to troops

who may be exposed to a treated area without pesticide protective equipment. Read and follow the pesticide label instructions and precautions.

If you can avoid it, do not use the same equipment for dispersing both herbicides and insecticides. If you have a frequently recurring need for applying herbicides, it is better to designate specific sprayers for this purpose, and not use them for anything else. Extremely small amounts of the contingency herbicides have a noticeable effect on some plants. It would be counterproductive to apply an insecticide for tick control around a defensive perimeter, only to discover a few days later that herbicide residues in the sprayer defoliated or discolored the vegetation that camouflaged fighting positions. This example, and the corrosive nature of herbicides, emphasizes the great importance of cleaning your spray equipment thoroughly after each herbiciding mission. Be particularly careful when disposing of rinse water, to prevent unwanted effects as described above.

Field commanders who desire to use herbicides may not be aware of all the restrictions. Before responding to a herbiciding mission, ensure that the chain of command is informed about the requirements and levels of authority for various herbicide uses as given in this section. The sources of this guidance are: Executive Order 11850, "Renunciation of Certain Uses in War of Chemical Herbicides and Riot Control Agents", dated 8 April 1975, which establishes the basic U.S. policy for wartime herbiciding, including pre-authorized uses and those requiring Presidential approval; and, Annex F to the current (TS) Joint Strategic Capabilities Plan (U), which provides implementing guidance from the Joint Chiefs of Staff to the Service components. Each Service may have supplementing regulations addressing the subject.

NOMENCLATURE AND NSN	**UNIT OF MEASURE**	**PRIORITY OF USE**	**DEFOLIATION CHARACTERISTICS**
Herbicide, Glyphosate 6840-01-108-9578	2 - 2 ½ gal btl	Moderately fast acting contact herbicide	Absorbed through foliage. Controls broad spectrum of grasses and broad-leaf plants. Effects show in 7-10 days. Rainfall within 6 hours reduces effect. Length of control depends on growing conditions (about 2-4 weeks in temperate climates).
Herbicide, Bromacil 6840-00-181-7106	5 gal drum	Slow acting solid sterilant	Absorbed through roots. Controls most plant species. Less effective for deep rooted plants in low rainfall areas. Effects show in 21-30 days. May control vegetation for a year or more, depending on dose, soil and rainfall.

Herbicide, Paraquat 6840-00-313-7178	1 gal btl	Fast acting contact herbicide. Emergency use only. Restricted use pesticide because it is very toxic.	Absorbed through foliage. Controls all vegetation. Effects show in 1-2 days. Length of control depends on growing conditions (about 4-8 weeks in temperate climates).

J. Supporting Military Operations in Urban Areas

The purpose of this section is not to give detailed guidance, but rather to give a general idea of what to expect. The worldwide growth of cities, driven by population increases, has changed the terrain on which battles are likely to be fought. Europe and Asia have more large cities than North America, and Latin America and Africa are not far behind. European countries are much more crowded than the United States. Population density in CONUS is 60 people square mile. In western Germany, it is 620; in Belgium and the Netherlands it is more than 1,000. Because of the military advantages of controlling cities, our forces train extensively for urban combat, and expect to fight in that environment. Consequently, you must be aware of the following characteristics of the urban environment during war:

In a conventional war, especially in Europe, half or more of your control efforts may be against pests/vectors in urban or suburban areas;

Disruption of civilian health and sanitary services will sharply increase the risk of disease among civilian and military personnel;

Most urban control efforts will be against often explosive populations of typical urban pests (flies, cockroaches, rodents) associated with potentially epidemic diarrheal and other diseases, rather than classic vectors such as mosquitoes or ticks;

Crowding of civilian populations, and the greatly reduced sectors and frontages of deployed combat forces, will promote rapid spread of disease;

Good sanitation and field hygiene in our deployed forces are critical to successful control efforts, and should be continually stressed through the chain of command (see para D. The Importance of Sanitation);

A single case of plague (flea-borne), from rodent reservoirs) or epidemic typhus (louse-borne) in the civilian or military population necessitates immediate and highest priority efforts to control the responsible vectors/reservoirs, because of the potential for epidemics.

Also of great concern will be refugees, displaced persons and POWs, when they are present. Their numbers, poor hygiene, and state of health may significantly contribute to the spread of disease among U.S. military forces. In these situations, your vector surveillance and control efforts must be closely coordinated with the responsible civil affairs units and with the

medical chain of command responsible for epidemiological surveillance and treatment of non-U.S. personnel.

II. CONTINGENCY PESTICIDES

The following are pesticides for contingency use by one or more of the Services, as indicated in the left columns. Each pesticide is available by requisition to all Services. Contingency Herbicides are addressed separately on page 6, paragraph I.

USA	USAF	USN	NOMENCLATURE	U/I	NSN
	X		Insecticide, Aluminum Phosphide, 55% Conc. Tablets	can of 100	6840-00145-0016
	X		Insecticide, Carbaryl, (Sevin®) 5% Dust	25 lb bag	6840-01-033-4481
	X	X	Insecticide, Chlorpyrifos (Dursban®), 1.5 ULV Mosquitocide	5 gal can	6840-01-203-6161
	X	X	Insecticide, Chlorpyrifos (Dursban®), 41% EC	1 gal can	6840-01-122-2651
*X	X	X	Insecticide, Chlorpyrifos (Dursban®), 41% EC	5 gal can	6480-00-402-5411
*X		X	Insecticide, Chlorpyrifos (Dursban®), Unit Dose 40ml, 42% EC	box of 12	6840-01-210-3392
X	X		Insecticide, Diazinon, 2% Dust	5 lb can	6840-00-955-0931
*X	X	X	Insecticide, Diazinon, 2% Dust	25 lb can	6840-00-753-5038
**	X		Insecticide, Diazinon, 48% EC	1 gal can	6840-00-782-3925
X	X		Insecticide, Dichlorvos (DDVP), 20%, Strip	box of 48	6840-00-142-9438
*X	X	X	Insecticide, d-Phenothrin, 2% Aerosol	12 oz can	6840-01-067-6674
	X		Insecticide, Ficam® (Bendiocarb), 76% WP	1 lb jar	6840-01-087-6672
X	X	X	Insecticide, Fly Bait (Flytek®)	5 lb can	6840-01-183-7244
*X		X	Insecticide, Lindane 1% Dust	25 lb can	6840-00-242-4219
X	X	X	Insecticide, Malathion, 57% EC	1 gal pail	6840-00-655-9222
		X	Insecticide, Malathion, 57% EC	5 gal can	6840-00-685-5438
	X	X	Insecticide, Malathion, 91% Concentrate	54 gal drum	6840-00-926-1481
*X			Insecticide, Malathion, 91% Concentrate	5 gal can	6840-01-169-1842
X	X	X	Insecticide, Naled (Dibrom®), 85% Liquid	18.9 ltr can	6840-01-099-9844

	X		Insecticide, Naled (Dibrom®), 85% Liquid	30 gal drum	6840-01-270-9765
X	X	X	Insecticide, Propoxur (Baygon®), 1% Oil Solution	1 gal (can)	6840-00-180-6069
X	X	X	Insecticide, Propoxur (Baygon®), 70% WP	1 lb jar	6840-01-113-6557
		X	Insecticide, Pyrenone®, Mosquito Capsules	box of 1000	6840-01-216-5369
X	X	X	Insect Repellent, Clothing Application, Aerosol, 0.5% Permethrin	12/6 oz cans/box	6840-01-278-1336
X	X	X	Insect Repellent, Clothing Application, Permethrin, 40% Liquid for 2 Gallon Sprayer	12/151 ml btls	6840-01-334-2666
X	X	X	Insect Repellent, Personal Application, (3M®/EPA 58007-1), 33% DEET Lotion	12/2 oz tubes/box	6840-01-284-3982
X	X	X	Insect Repellent, Personal Application, 33% DEET Stick	12/1 oz stk/box	6840-00-142-8965
*X ***	X	X	Insect Repellent, Clothing and Personal, 75% DEET	2 oz btl	6840-00-753-4963
*X			Rodenticide, Anticoag., Universal Concentrate	1 lb can	6840-00-753-4972
*X			Rodenticidal Bait, Anticoag., Ready Mix	5 lb can	6840-00-753-4973
X			Rodenticidal Bait, Anticoag., 8 oz block, Diphacinone	box of 40	6840-00-089-4664
*X	X	X	Rodenticidal Bait, Anticoag., Quick Kill, Bromadiolone, (Maki®) or Brodifacoum (Talon®)	11 lb can	6840-01-151-4884

* Designated for stockage in USA War Reserves
** May not be air transportable in container provided by manufacturer, See Section VIII, p. 28
*** Not air transportable in bulk quantities (i.e, boxes of 48 bottles) without over packing. See Section VIII, p. 28

III. PESTICIDE RECOMMENDATIONS

A. How to Use This Section

1. Pesticide recommendations in this section are for use as a quick reference only, to help you identify your options from the list of contingency pesticides in Section II. **Read the**

actual labels of the pesticides you are considering, before making a final decision on which one to use. A specific pesticide may be provided to the military by more than one manufacturer, so label information may vary somewhat among products with the same NSN.

2. Pesticides are listed in alphabetical order within each section, **NOT** in any order of preference for use.

3. Most of the individual pesticides have several uses and so are listed under several pest groups. Information on a pesticide in a given section, applies **only** to its uses against the pest(s) in that section.

4. The pesticides are diluted with water unless otherwise stated.

B. Pest groups on the following pages are listed in the order in the Table of Contents, page ii.

1. BITING FLIES*

Pesticide	Unit of Issue	Dilution Rate and (% Finished Concentration)	Label Information
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3392	case of 12 btls, 40 ml each	40ml (1 bottle)/gal (0.5%)	For outdoor use only. Use for outside surfaces of buildings and perimeter treatments as a residual spray where pests congregate or have been seen. Do not apply directly to water or to flowering plants.
Dichlorvos (DDVP) 20% Strip 6840-00-142-9438	box of 48	N/A (20%)	For indoor use only. Suspend one strip per 1,000 cubic feet (10ft x 10ft x 10ft) of building space. Do not use in food preparation or serving areas. Do not use in patient areas of medical treatment facilities.
d-Phenothrin 2% Aerosol 6840-01-067-6674	12 oz can	Preformulated Aerosol (2%)	Use as a space spray for aircraft disinsection, and in buildings, vans, ships, and in tentage. Spray 10 seconds per 1,000 cubic feet (10ft X 10ft x 10ft).
Malathion 57% EC 6840-00-655-9222	1 gal pail	4.6 oz/gal 1 part to 28 parts water (2%)	For outdoor use only. Dilute 1 part concentrate to 28 parts water, fuel oil, or diesel oil. Apply as a spray. Can cause spotting of paint on vehicles. Oil-based sprays may injure vegetation.
Malathion 57% EC 6840-00-685-5438	5 gal can	4.6 oz/gal 1 part to 28 parts water (2%)	For outdoor use only. Dilute 1 part concentrate to 28 parts water. Fuel oil, or diesel oil. Apply as a spray. Can cause spotting of paint on vehicles. Oil-based sprays may injure vegetation.

Malathion 91% Concentrate 6840-00-926-1481	54 gal drum	Apply Undiluted (91%)	For outdoor use only in ground or aerial ULV equipment at 6-8 oz/acre. Label includes extensive directions for application, equipment calibration, and droplet size determination. Spray droplets may permanently damage paint on vehicles.
Malathion 91% Concentrate 6840-01-169-1842	5 gal drum	Apply undiluted (91%)	For outdoor use only in ground or aerial ULV equipment at 6-8 oz/acre. Label includes extensive directions for application, equipment calibration, and droplet size determination. Spray droplets may permanently damage paint on vehicles.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal or 8 oz/gal (1.1% or 4.5%)	For outdoor use only. Must be agitated frequently to prevent clogging of spray equipment. Apply 2 oz/gal as a residual spray to outside building surfaces and screens where pests congregate. Use against sand flies and *Culicoides* biting midges (punkies) by applying 8 oz/gal with a paint brush to outside surfaces of doors, window screens, and other screened areas where pests may enter.
Repellent, Clothing Application 75% DEET 6840-00-753-4963	2 oz btl	Apply Undiluted (75%)	For use only for retreatment of repellent parka.
Repellent, Clothing Aerosol, 0.5% Permethrin 6840-01-278-1336	12/6 oz cans/box	Apply as formulated	Apply to clothing. DO NOT APPLY WHILE THE CLOTHING IS BEING WORN. Allow two hours for drying, or four hours under humid conditions.
Repellent, Clothing 40% Permethrin 6480-01-334-2666	12/151 ml btl/box	1 btl/2 gal water	For use in 2-gal. Sprayer for treatment of BDU's, bednets and tents by trained personnel ONLY. Do not allow skin contact until treated surfaces dry.
Repellent, Personal 33% DEET Lotion (3M®) 6840-01-284-3982	12/2 oz tubes/box	Apply as formulated	Apply thin layer to exposed skin. Avoid contact with eyes and lips.
Repellent, Personal 33% DEET Stick 6840-00-142-8965	12/1 oz stk/box	Apply as formulated	Primary use in aviator survival kits. Formulation is better suited to flight conditions in high performance aircraft. DEET lotion works best for all other needs.

*__NOTE__: Pesticides labeled for use against adult mosquitoes (p. 16) may be used to control other biting flies, so long as:

1. The target biting flies are at the same site as would be adult mosquitoes.

2. The pesticide is applied according to directions for use against adult mosquitoes.
3. The pesticide label does not prohibit use against the target pest.
4. All other applicable label directions and precautions are followed.

2. COCKROACHES

Pesticide	Unit of Issue	Dilution Rate and (% Finished Concentration)	Label Information
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3392	box of 12 btls, 40 ml each	40 ml (1 bottle)/gal (0.5%)	For indoor and outdoor use. Indoors, apply as spot treatment (including crack and crevice) in food storage, preparation, and serving areas, in medical treatment facilities, and in billets. Outdoors apply as a residual spray to outside surfaces of buildings and other areas such as refuse dumps, where cockroaches congregate or have been seen.
Diazinon 2% Dust 6480-00-955-0931	5 lb can	Apply as formulated (2.0%)	For indoor use. Apply as residual dust using spot treatment, including crack and crevice treatment.
Diazinon 2% Dust 6840-00-753-5038	25 lb can	Apply as formulated (2.0%)	For indoor use. Apply as residual dust using spot treatment, including crack and crevice treatment.
Diazinon 48% EC 6840-00-782-3925	1 gal can	2.5 oz/gal (1%)	For indoor use. Apply as residual dust using spot treatment, including crack and crevice treatment
Ficam® (Bendiocarb) 76% WP 6840-01-087-6672	1 lb jar polyethylene	0.4 oz/gal (0.25%)	For indoor and outdoor use. Requires frequent agitation to prevent clogging of sprayer. Indoors apply as coarse low pressure spot or crack and crevice spray. Can be used in food areas of food handling establishments. Outdoors apply as a residual spray perimeter treatment where cockroaches congregate. Use 0.8 oz/gal (0.5%) for heavy infestations.
Propoxur (Baygon®) 1% Oil solution 6840-00-180-6069	1 gal can	Apply Undiluted (1.0%)	For indoor use only. Apply as a residual spray using spot treatments, including crack and crevice treatment. Do not use as a space spray.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%)	For indoor and outdoor use. Requires frequent agitation to prevent clogging of spray equipment. Apply indoors as a residual spray by spot treatments, including crack and crevice treatment. Do not use as a residual spray to surfaces of buildings where cockroaches may congregate.

3. FILTH FLIES

Pesticide	Unit of Issue	Dilution Rate and (% Finished Concentration)	Label Information
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3992	box of 12 btls, 40 ml each	40 ml (1 bottle)/gal (0.5%)	For outdoor use only. Use for outside surfaces of buildings and perimeter treatments as a residual spray where pests congregate or have been seen. Do not apply directly to water or to flowering plants.
Dichlorvos (DDVP) 20% Strip 6840-00-142-9438	box of 48	NA (20%)	For indoor and outdoor use. Indoors suspend one strip per 1,000 cubic feet (10ft x 10ft x 10ft) of building space. Do not use in food preparation or serving areas. Do not use in patient areas of medical treatment facilities. For outdoor use only in garbage cans. Attach on strip inside each can. Keep lid on can.
d-Phenothrin 2% Aerosol 6840-01-067-6674	12 oz can	Preformulated Aerosol (2.0%)	Use as a space spray for aircraft disinsection, and in buildings, vans, ships, and in tentage. Spray 10 seconds per 1,000 cubic feet (10ft x 10ft x 10ft).
Fly Bait 1% Methomyl 6840-01-183-7244	5 lb can	Premixed Bait (1.0%)	For outdoor use only. Bait should be scattered over specified fly feeding areas (or military equivalent sites) daily or as needed. Scatter the bait (do not put in piles) at the rate of approximately 0.5 lb per 1,00 sg ft of fly feeding area. Distribute bait from container or from other device to avoid handling.
Malathion 57% EC 6840-00-655-9222	1 gal pail	2.56 oz/gal 2 gal/100 gal (1.12%)	For outdoor use, except may be used in buildings which house domestic animals. Apply the finished spray at the rate of 2 gal/1,00 sg ft on unpainted surfaces where adult flies alight or congregate. May be mixed with specified amounts of sugar, corn syrup, or molasses to form a bait for use in controlling adult flies or maggots. Use 3 gal EC with 40 lbs sugar per 100 gallons of water if the fly population is severe.
Malathion 57% EC 6840-00-685-5438	5 gal can	2.56 oz/gal 2 gal/100 gal (1.12%)	For outdoor use, except may be used in buildings which house domestic animals. Apply the finished spray at the rate of 2 gal/1,00 sg ft on unpainted surfaces where adult flies alight or congregate. May be mixed with specified amounts of sugar, corn syrup, or molasses to form a bait for use in controlling adult flies or maggots. Use 3 gal EC with 40 lbs sugar per 100 gallons of water if the fly population is severe.

Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%)	For outdoor use only. Requires frequent agitation to prevent clogging of spray equipment. Apply as a residual spray to surfaces of buildings and screens where flies congregate.

4. FLEAS

Pesticide	**Unit of Issue**	**Dilution Rate and (%Finished Concentration)**	**Label Information**
Carbaryl (Sevin®) 5% Dust 6840-01-033-4481	25 lb bag	Apply as Formulated (5.0%)	For outdoor use only in controlling plague vectors. Apply 2 oz per animal burrow, or 0.25 lb to each 4 to 6 bait stations per acre, or 20 lbs per acre as an area dusting by power or hand applicator.
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3992	box of 12 btls, 40 ml each	40 ml (1 bottle)/gal (0.5%)	For indoor use only. Apply as a fine-particle broadcast spray to floor areas. Keep non-applicators out during treatment, and until spray has dried. Do not use in animal buildings.
Diazinon 48% EC 6840-00-782-3925	1 gal can	0.4 oz/gal (0.2%)	For outdoor use only. Apply as a residual spray in 5 ft- wide band to the ground around the structure or area to be protected, as well as to the structure wall from ground level to a height of 2 or 3 feet.
Ficam® (Bendiocarb) 76% WP 6840-01-087-6672	1 lb jar polyethylene	0.4 oz/gal (0.25%)	For indoor and outdoor use. Requires frequent agitation to prevent clogging of sprayer. Indoors spray cracks and crevices, rugs, and floor coverings. Outdoors apply as a residual spray perimeter treatment where fleas congregate.
Propoxur (Baygon®) 1 % Oil Solution 6840-00-180-6069	1 gal can	Apply Undiluted (1.0%)	For outdoor use only. Apply as a residual spray to infested areas and to outside surfaces of structures where fleas may enter. Do not spray vegetation.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%)	For outdoor use only. Requires frequent agitation to prevent clogging of spray equipment. Apply as a residual spray to outdoor surfaces where fleas congregate. Do not treat vegetation.

5. LICE

Pesticide	Unit of Issue	Dilution Rate and (% Finished Concentration)	Label Information
Repellent, Clothing Aerosol, 0.5% Permethrin 6840-01-2781336	12/6 oz cans/box	Apply as Formulated	Apply to clothing. DO NOT APPLY WHILE THE CLOTHING IS BEING WORN. Allow two hours for drying, or four hours under humid conditions.
Repellent, Clothing 40% Permethrin 6840-0 -334-2666	12/151 ml btl/box	1 btl/2 gal water	For use in 2-gal sprayer for treatment of BDU's, bednets and tents by trained personnel ONLY. Do not allow skin contact until treated surfaces dry.
Repellent, Personal 33% Deet Lotion (3M®) 6840-01-284-3982	12/2 oz tubes/box	Apply as Formulated	Apply thin layer to exposed skin. Avoid contact with eyes or lips.
Repellent, Personal 33% Deet Stick 6640-00-142-8965	12/1 oz stk/box	Apply as Formulated	Primary use in aviator survival kits. Formulation is better suited to flight conditions in high performance aircraft. Deet lotion works best for all other needs.
Lindane 1% Dust 6840-00-242-4219	25 lb pail	Apply as Formulated (1.0%)	For use only in unit or mass delousing operations. For clothing treatment only, against body lice only. Use only in emergencies, and only when authorized by medical authorities. If powered mass-delousing equipment is not available, dust may be applied with a manual duster or shaker cans.

6. MITES (CHIGGERS)

Pesticide	Unit of Issue	Dilution Rate and (% Finished Concentration)	Label Information
Chlorpyrifos (Dursban®) 41% EC 6840-01-122-2651	1 gal can	16 oz of Concentrate/Acre (Variable Concentration)	For outdoor use only. Dilute with water and apply at 16 oz concentrate/acre as a spray on roadsides, footpaths and trails, bivouac sites, and other infested noncropland areas, using hydraulic sprayer, mist applicator, backpack sprayer or suitable hand or power spray equipment. Treat low underbrush, grassy areas, weeds, and ground surface or debris. Vacate treated areas until spray has dried.

Chlorpyrifos (Dursban®) 41% EC 6840-00-402-5411	5 gal can	16 oz of Concentrate/Acre (Variable Concentration)	For outdoor use only. Dilute with water and apply at 16 oz concentrate/acre as a spray on roadsides, footpaths and trails, bivouac sites, and other infested noncropland areas, using hydraulic sprayer, mist applicator, backpack sprayer or suitable hand or power spray equipment. Treat low underbrush, grassy areas, weeds, and ground surface or debris. Vacate treated areas until spray has dried.
Diazinon 48% EC 6840-00-782-3925	1 gal can	0.4 oz/gal (0.2%)	For outdoor use only. Apply as a residual spray in a 5ft-wide band to the ground around structure or area to be protected, as well as to the structure wall from ground level to a height of 2 or 3 feet.
Repellent, Clothing Aerosol, 0.5% Permethrin 6840-01-278-1336	12/6 oz cans/box	Apply as Formulated	Apply to clothing. DO NOT APPLY WHILE THE CLOTHING IS BEING WORN. Allow two hours for drying, or four hours under humid conditions.
Repellent, Clothing 40% Permethrin 6840-01-334-2666	12/151 ml btl/box	1 btl/2 gal water	For use in 2-gal sprayer for treatment of BDU's, bednets and tents by trained personnel ONLY. Do not allow skin contact until treated surfaces dry.
Repellent, Personal 33% Deet Lotion (3M®) 6840-01-284-3982	12/2 oz tubes/box	Apply as Formulated	Apply thin layer to exposed skin. Avoid contact with eyes or lips.
Repellent, Personal 33% Deet Stick 6840-00-142-8965	12/1 oz stk/box	Apply as Formulated	Primary use in aviator survival kits. Formulation is better suited to flight conditions in high performance aircraft. Deet lotion works best for all other needs.

7. MOSQUITOES (ADULT)*

Pesticides	**Unit of Issue**	**Dilution Rate and (% Finished Concentration)**	**Label Information**
Chlorpyrifos (Dursban®) 19.36% (1.5 ULV), Mosquitocide 6840-01-203-6161	5 gal can	Apply per label directions	ULV cold fog application for ground or aerial spray to control mosquitoes in residential or recreational areas.

Chlorpyrifos (Dursban®) 41 % EC 6840-01-122-2651	1 gal can	0.8-1.6 oz/acre (Variable Concentration)	For outdoor use only. Dilute with water or oil for use in equipment such as hand and power ground sprayers, mist applicators, and aerial spray equipment. Use 0.8 oz concentrate per acre in light to medium vegetative cover. Toxic to fish, birds, and other wildlife. Keep out of lakes, streams, ponds, tidal marshes, and estuaries.
Chlorpyrifos (Dursban®) 41% EC 6840-00-402-5411	5 gal can	0.8-1.6 oz/acre (Variable Concentration)	For outdoor use only. Dilute with water or oil for use in equipment such as hand and power ground sprayers, mist applicators, and aerial spray equipment. Use 0.8 oz concentrate per acre in light to medium vegetative cover. Toxic to fish, birds, and other wildlife. Keep out of lakes, streams, ponds, tidal marshes, and estuaries.
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3392	box of 12 btls, 40 ml each	40 ml (1 bottle)/gal (0.5%)	Use for outside surfaces of buildings and for perimeter treatments as a residual spray where adult mosquitoes congregate or have been seen. Do not apply inside buildings. Do not apply to flowering plants.
Dichlorvos (DDVP) 20% Strip 6840-00-142-9438	box of 48	N/A (20%)	For indoor and outdoor use. Indoors, suspend one strip per 1,000 cubic feet (10ft x 10ft x 10ft) of building space. Do not use in food preparation or serving areas. Do not use in patient areas of medical treatment facilities. For outdoor use in catch basins only. Suspend one strip about 10 inches above the water line in each basin. (Outdoor use not authorized on labels of some suppliers of this NSN item).
d-Phenothrin 2% Aerosol 6840-01-067-6674	12 oz can	Preformulated Aerosol (2.0%)	For indoor use. Use as a space spray for aircraft disinsection. and buildings, vans, ships, and in tentage. Spray 10 seconds per 1,000 cubic feet (10ft x 10ft x 10ft).
Ficam® (Bendiocarb) 76% WP 6840-01-087-6672	1 lb jar polyethylene	1.6 oz/gal (1.0%)	For indoor use only. Requires frequent agitation to prevent clogging of sprayer. Spray around doors, windows and screens, and other places mosquitoes may enter.
Malathion 57% EC 6840-00-655-9222	1 gal pail	4.6 oz/gal 1 part to 28 parts water (2%)	For outdoor use only. Dilute 1 part EC to 28 parts water, fuel oil, or diesel oil. Apply as a spray. Can cause spotting of paint on vehicles. Oil-based sprays may injure vegetation.
Malathion 57%EC 6840-00-685-5438	5 gal can	4.6 oz/gal 1 part to 28 parts water (2%)	For outdoor use only. Dilute 1 part EC to 28 parts water, fuel oil, or diesel oil. Apply as a spray. Can cause spotting of paint on vehicles. Oil-based sprays may injure vegetation.

Malathion 91 % Concentrate 6840-00-926-1481	54 gal drum	Apply Undiluted (91%)	For outdoor use only in ground or aerial ULV equipment. For application with ground equipment to nonagricultural land, use 2-4 oz/acre (6-8 oz/acre if other pest flies are also present). For aerial application, use 2.6 to 3.0 oz/acre. Label includes extensive directions for application, equipment calibration, and droplet size determination. Spray droplets may permanently damage paint on vehicles.
Malathion 91 % Concentrate 6840-01-169-1842	5 gal can	Apply Undiluted (91%)	For outdoor use only in ground or aerial ULV equipment. For application with ground equipment to non-agricultural land, use 2-4 oz/acre (6-8 oz/acre if other pest flies are also present). For aerial application, use 2.6 to 3.0 oz/acre. Label includes extensive directions for application, equipment calibration, and droplet size determination. Spray droplets may permanently damage paint on vehicles.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%), or 1.0-1.5 oz/acre (Mist), or 1.0-4.0 oz/acre (ULV by air)	For outdoor use only. Requires frequent agitation to prevent clogging of spray equipment. Use 2 oz/gal as a residual spray applied to surfaces of buildings and screens where mosquitoes congregate. For mist spray application by vehicle-mounted mist blowers, use 1.0 to 1.5 oz per acre. For ULV aerial spray applications, use 1 to 4 oz per acre in ½ to 1 gal total volume of water or oil suspension. When using oil, premix before adding to aircraft tank. Birds feeding on treated areas may be killed.
Repellent, Clothing Application 75% DEET 6840-00-753-4963	2 oz btl	Apply Undiluted (75%)	For use only for retreatment of repellent parka.
Repellent, Clothing Aerosol, 0.5% Permethrin 6840-01-278-1336	12/6 oz cans/box	Apply as formulated	Apply to clothing. DO NOT APPLY WHILE THE CLOTHING IS BEING WORN. Allow two hours for drying, or four hours under humid conditions.
Repellent, Clothing 40% Permethrin 6480-01-334-2666	12/151 ml btl/box	1 btl/2 gal water	For use in 2-gal. Sprayer for treatment of BDU's, bednets and tents by trained personnel ONLY. Do not allow skin contact until treated surfaces dry.
Repellent, Personal 33% DEET Lotion (3M®) 6840-01-284-3982	12/2 oz tubes/box	Apply as formulated	Apply thin layer to exposed skin. Avoid contact with eyes and lips.

Repellent, Personal 33% DEET Stick 6840-00-142-8965	12/1 oz stk/box	Apply as formulated	Primary use in aviator survival kits. Formulation is better suited to flight conditions in high performance aircraft. DEET lotion works best for all other needs.

*** See NOTE on use Against Other Biting Flies, p. 10**

8. MOSQUITOES (LARVA)

Pesticide	**Unit of Issue**	**Dilution rate and (% Finished Concentration)**	**Label Information**
Chlorpyrifos (Dursban®) 19.36% (1.5 ULV) Mosquitocide 6840-01-203-6161	5 gal can	Apply per label directions	ULV cold fog application for ground or aerial spray to control mosquitoes in residential or recreational areas.
Chlorpyrifos (Dursban®) 41% EC 6840-01-122-2651	1 gal can	0.4-1.6 oz/acre in water or oil (Variable Concentration)	For outdoor use only. Dilute with water or oil for use in equipment such as hand and power ground sprayers. mist applicators. and aerial spray equipment. Use 0.4 to 0.8 oz/acre for light (or no) to medium vegetative cover, and 0.8 to 1.6 oz/acre for medium to heavy vegetative cover. Apply to standing water, temporary rainpools, intermittently flooded areas. stagnant water. and similar non-crop areas serving as breeding sites. Special directions for waste water treatment.
Chlorpyrifos (Dursban®) 41% EC 6840-00-402-5411	5 gal can	0.4-1.6 oz/acre in water or oil (Variable Concentration)	For outdoor use only. Dilute with water or oil for use in equipment such as hand and power ground sprayers, mist applicators, and aerial spray equipment. Use 0.4 to 0.8 oz/acre for light (or no) to medium vegetative cover, and 0.8 to 1.6 oz/acre for medium to heavy vegetative cover. Apply to standing water, temporary rainpools, intermittently flooded areas, stagnant water, and similar non-crop areas serving as breeding sites. Special directions for waste water treatment.
Malathion 57% EC 6840-00-655-9222	1 gal pail	13.0 oz/acre in water or oil (Variable Concentration)	For outdoor use only. For application by air or ground equipment to larvae in standing water (intermittently flooded areas, stagnant water, temporary rainpools). Keep out of lakes, streams, ponds, tidal marshes, and estuaries. Do not apply where runoff is likely to occur.

Malathion 57% EC 6840-00-685-5438	5 gal can	13.0 oz/acre in water or oil (Variable Concentration)	For outdoor use only. For application by air or ground equipment to larvae in standing water (intermittently flooded areas, stagnant water, temporary rainpools). Keep out of lakes, streams, ponds, tidal marshes, and estuaries. Do not apply where runoff is likely to occur.
Pyrenone®, Mosquito Capsules 1 % Pyrethrins 6840-01-216-5369	box of 1,000 (20 canisters, 50 capsules each)	Apply as Formulated (1.0%)	For outdoor use only. Toss capsules into water at a maximum rate of one capsule per 100 sq ft of open water surface, per 6 inches of depth. Use in breeding sites such as stagnant pools, road and irrigation ditches, catch basins, artificial containers, lake shore lines, quarries, and marshy areas.

9. STORED PRODUCTS PESTS

Pesticide	**Unit of Issue**	**Dilution Rate and (% Finished Concentration)**	**Label Information**
Aluminum Phosphide 55% Conc. Tablets 6840-00-145-0016	can of 100	Use as Formulated (55.0%)	For use only in fumigation of insects infesting stored products. Restricted use pesticide. Pellets are explosive if they come in contact with water. For use only by applicators trained in Aluminum Phosphide fumigation.
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3392	box of 12 btls, 40 ml each	40 ml (bottle)/gal (0.5%)	In temporary or permanent subsistence storage areas and within food handling areas, use as a spot treatment applied as a coarse, low pressure spray to localized areas. Spot treatment may include crack and crevice treatment.
Diazinon 48% EC 6840-00-782-3925	1 gal can	1.25 oz/gal (0.5%)	In temporary or permanent subsistence storage areas apply as a spot treatment. Do not use in food areas of food-handling facilities.
Dichlorvos (DDVP) 20% Strip 6840-00-142-9438	box of 48	N/A (20.0%)	Use in temporary or permanent non-perishable subsistence storage areas to control flying stages. Suspend one strip per 1,000 cubic feet of space (10ft x 10ft x 10ft).
Ficam® (Bendiocarb) 76% WP 6440-01-087-6672	1 lb jar polyethylene	0.4 oz/gal (0.25%)	For indoor use only. Requires agitation to prevent clogging of spray equipment. Spray shelving and cupboards after foodstuffs and utensils have been removed. Labeled for several stored products pests (exposed stages).

Propoxur (Baygon®) 1 % Oil Solution 6840-00-180-6069	1 gal can	Apply Undiluted (1.0%)	For indoor use only. Labeled for controlling exposed stages of saw-toothed grain beetles, but label does not prohibit use against other stored products pests. Apply as a residual spot treatment, including crack and crevice treatment. Do not use as a space spray.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%)	For indoor use only. Requires frequent agitation to prevent clogging of spray equipment. Labeled for controlling exposed stages of saw-toothed grain beetle but label does not prohibit use against other stored products pests. Apply indoors as a residual spray by spot treatment including crack and crevice treatment. In food areas, use only for crack and crevice treatment. Do not use as a space spray.

10. TICKS

Pesticide	**Unit of Issue**	**Dilution Rate and (% Finished Concentration)**	**Label Information**
Chlorpyrifos (Dursban®) 41% EC 6840-01-122-2651	1 gal can	16 oz Concentrate/Area (Variable Concentration)	For outdoor use only. Dilute with water and apply at 16 oz concentrate/acre as a spray on roadsides, footpaths and trails, bivouac sites and other infested non-crop areas, using hydraulic sprayer, mist applicator, backpack sprayer, or other suitable hand or power spray equipment. Treat low underbrush, grassy areas, weeds, and ground surfaces and debris. Vacate treated areas until spray has dried.
Chlorpyrifos (Dursban®) 41% EC 6840-00-402-5411	5 gal can	16 oz Concentrate/Area (Variable Concentration)	For outdoor use only. Dilute with water and apply at 16 oz concentrate/acre as a spray on roadsides, footpaths and trails, bivouac sites and other infested non-crop areas, using hydraulic sprayer, mist applicator, backpack sprayer, or other suitable hand or power spray equipment. Treat low underbrush, grassy areas, weeds, and ground surfaces and debris. Vacate treated areas until spray has dried.
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-2103392	box of 12 btls. 40 ml each	40 ml (1 bottle)/gal (0.5%)	For indoor and outdoor use. Indoors, apply as a spot treatment to localized areas of floors along baseboards. Includes crack and crevice treatment. Labeled for indoor use against brown dog ticks only, but may be used for other tick species at the same sites. Outdoors, use for outside surfaces of buildings and for perimeter treatments where ticks congregate or have been seen.

Diazinon 48% EC 6840-00-782-3925	1 gal can	0.4 oz/gal (0.2%) or 1.25 oz/gal (0.5%)	For indoor and outdoor use. Indoors, apply as a 0.5% residual using spot treatment including crack and crevice. Labeled for indoor use against brown dog tick. Outdoors, apply as a 0.2% residual spray in a 5 ft-wide band around structure or area to be protected, as well as to the structure wall from ground level to a height of 2 or 3 feet.
Ficam® (Bendiocarb) 76% WP 6840-01-087-6672	1 lb jar polyethylene	0.4 oz/gal (0.25%)	For indoor and outdoor use. Requires frequent agitation to prevent clogging of spray equipment. Indoors, spray cracks and crevices, rugs, and floor coverings. Outdoors apply as a residual spray perimeter treatment where pests congregate. Labeled for controlling brown dog ticks only, but label does not prohibit use against other species at same sites.
Propoxur (Baygon®) 1% Oil Solution 6840-00-180-6069	1 gal can	Apply Undiluted (1.0%)	For outdoor use only. Labeled for controlling brown dog ticks only, but label does not prohibit use against other species at same sites. Apply as a residual spray to infested areas and to outside surfaces of structures where pests may enter. Do not spray vegetation.
Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2 oz/gal (1.1%)	For outdoor use only. Requires frequent agitation to prevent clogging of spray equipment. Apply as a residual spray to outside building surfaces where ticks may congregate.
Repellent, Clothing Application 75% DEET 6840-00-753-4963	2 oz btl	Apply Undiluted (75%)	For use only for retreatment of repellent parka.
Repellent, Clothing Aerosol, 0.5% Permethrin 6840-01-278-1336	12/6 oz cans/box	Apply as formulated	Apply to clothing. DO NOT APPLY WHILE THE CLOTHING IS BEING WORN. Allow two hours for drying, or four hours under humid conditions.
Repellent, Clothing 40% Permethrin 6480-01-334-2666	12/151 ml btl/box	1 btl/2 gal water	For use in 2-gal. Sprayer for treatment of BDU's, bednets and tents by trained personnel ONLY. Do not allow skin contact until treated surfaces dry.
Repellent, Personal 33% DEET Lotion (3M®) 6840-01-284-3982	12/2 oz tubes/box	Apply as formulated	Apply thin layer to exposed skin. Avoid contact with eyes and lips.

Repellent, Personal 33% DEET Stick 6840-00-142-8965	12/1 oz stk/box	Apply as formulated	Primary use in aviator survival kits. Formulation is better suited to flight conditions in high performance aircraft. DEET lotion works best for all other needs.

11. VENOMOUS ARTHROPODS

Pesticide	**Unit of Issue**	**Dilution Rate and (% Finished Concentration)**	**Label Information**
Chlorpyrifos (Dursban®) 42% EC, Unit Dose 6840-01-210-3392	box of 12 btls, 40 ml each	40 ml (bottle)/gal (0.5%)	For indoor and outdoor use against ants and spiders. Indoors, apply as a spot treatment in localized areas, including crack and crevice treatment. Outdoors, use for outdoor surfaces of building and perimeter treatments as a residual spray where pests congregate or have been seen. Do not apply to flowering plants.
Diazinon 2% Dust 6840-00-955-0931	5 lb can	Apply as Formulated	For indoor use only. Apply as a residual dust using spot treatment, including crack and crevice treatment.
Diazinon 2% Dust 6840-00-753-5038	25 lb can	Apply as Formulated	For indoor use only. Apply as a residual dust using spot treatment, including crack and crevice treatment.
Diazinon 48% EC 6840-00-782-3925	1 gal can	1.25 oz/gal (0.5%) or 0.4 oz/gal (0.2%)	For indoor and outdoor use. Indoors, use against ants, spiders, and scorpions as a 0.5% residual spray applied as a spot treatment. Outdoors, use against ants as a 0.2% residual spray applied in a 5 ft-wide band around structure or area to be protected, as well as to structure wall from ground level to a height of 2 or 3 feet.
Ficam® (Bendiocarb) 76% WP 6848-01-087-6672	1 lb jar polyethylene	0.4 oz/gal (0.25%)	For indoor and outdoor use. Requires frequent agitation to prevent clogging of spray equipment. Label includes specific treatment methods for ants, spiders, wasps and bees, centipedes and scorpions.
Propoxur (Baygon®) 1% Oil Solution 6840-00-180-6069	1 gal can	Apply Undiluted (1.0%)	For indoor and outdoor use. Indoors, use against ants, spiders, and scorpions applied as a spot treatment, including crack and crevice treatment. Do not use as a space spray. Outdoors, use against ants by spraying infested areas, ant hills, and runways.

Propoxur (Baygon®) 70% WP 6840-01-113-6557	1 lb jar	2.0 oz/gal (1.1%)	For indoor and outdoor use against ants, spiders, and scorpions. Requires frequent agitation to prevent clogging of spray equipment. Indoors apply as a residual spray using spot treatments, including crack and crevice treatments. Do not use as a space spray. In food areas, limited to crack and crevice treatment only. Outdoors apply as a residual spray to structural surfaces where pests congregate.

12. COMMENSAL RODENTS

Pesticide	**Unit of Issue**	**Dilution Rate and (% Finished Concentration)**	**Label Information**
Rodenticide, Anticoag., Univ. Conc. 6840-00-753-4972	1 lb can	Mix According to Label	Both liquid and dry concentrates are available. Use according to label directions. Suggested bait materials are cornmeal or rolled oats. In dry areas, the liquid bait may be most effective due to scarcity of water.
Rodenticidal Bait, Anticoag., Ready Mix 6840-00-753-4973	5 lb can	Use as Formulated	Place 4 oz to 1 lb of bait in each of several locations where rats feed, water, or travel. For mice, use smaller amounts. Do not store near stored food items, or where people who cannot read English have access to the cans. The cans and contents are easily confused with food items for human consumption.
Rodenticidal Bait, Anticoag., 0.005% Diphacinone 6840-00-089-4664	ctn of 40 blocks, 8 oz ea	Use as Formulated (0.005%)	For use in CONEX containers, vans, and other military equipment and containers. Use 1 bait block per 5 linear feet of container length.
Rodenticidal Bait, Anticoag., Quick Kill 0.005% Bromadioline (Maki®), or 0.005% Brodifacoum (Talon®) 6840-01-151-4884	11 lb can	Use as Formulated (0.005%)	For control of domestic rodents in and around the periphery of dwellings, industrial, commercial, and public buildings. Do not use in sewers. Some labels permit use in and around transport vehicles (ships, trains, and aircraft), and related port or terminal buildings. For rats, use 5-16 oz bait per bait station (usually at 15-30 ft intervals). For mice only, use 0.25-2.0 oz per station, at 8 to 12 ft intervals.

IV PESTICIDE DISPERSAL EQUIPMENT

3740-01-096-2078 CONTAINER, BAIT, RODENT (BOX OF 24). Liquid rodent bait dispensers, for use with RODENTICIDE, NSN 6840-00-753-4972.

4230-00-224-8636 DELOUSING OUTFIT, POWER DRIVEN. 10-gun delousing unit for control of body lice with 1% lindane dust, 6640-00-242-4219. Not readily available via requisition. Replacement delouser under development.

3740-00-132-5935 DUSTER, INSECTICIDE, MANUALLY OPERATED. Rotary fan duster, 5-10 lb hopper capacity. Primarily used to treat rodent burrows for ectoparasite control.

3740-00-132-5936 DUSTER, MANUALLY OPERATED, TUBULAR PUMP. For human louse control, or for placing dusts in inaccessible places harboring vectors/pests. Approx. 3 in diameter, 10 in long.

3740-01-206-9636 FAN ,ULV, BATTERY-OPERATED. Light-weight hand-held ULV device for ULV application to localized areas. Includes carrying case, 3 polyethylene pesticide containers, 4 interchangeable nozzles (different flow rates), battery, and battery charger. FOG GENERATORS, INSECTICIDE (ULV), SKID-MOUNTED, GASOLINE ENGINE DRIVEN. (For mounting on ground vehicles). Heavy duty models used by USAF.

*3740.00.375.9154 LECO model HD. Weight 525 lb.

*3740.01.076.1341 Londonaire model XKA. Weight 280 lb.

*3740-01-083-3570 Microgen model G-9HD. Weight 320 lb.

*3740-01-141-2557 Curtis-Dyna model 2740 Cydotronic. Weight 495 lb.

*These four NSN's are interchangeable. Regardless of NSN ordered, the requisition will be filled with whichever model is on hand in depot stocks. USAF uses LECO model HD.

3740-01-253-2836 FOG GENERATORS, INSECTICIDE (U LV), TRUCK-MOUNTED, GASOLINE ENGINE DRIVEN, 15 gallon tank, 11 horsepower engine, 4 nozzles included, Mfr. Curtis Dyna - Part No: MDL 2952.

3740-01-206-9635 FOG GENERATOR, INSECTICIDE (ULV), BATTERY OPERATED. (For mounting on ground vehicles). BEECOMIST model Pro-Mist

15MP. Can be powered with vehicle battery or separate battery (12V). Weight 75 lb. Lightweight, medium duty model.

3740-01-206-9614 SPRAYER, AERIAL (model PAU-9). Single-boom electric-powered (from 28VDC power source in helicopter), 10 nozzle ULV sprayer with 60 gallon tank capacity. For internal mounting in UH1/3 helicopters. Used by USN. Not readily available via requisition.

3740-00-772-0090 SPRAYER, INSECTICIDE, FRAME-MOUNTED, MIST AND SOLID STREAM, 360 gal per hr. Gasoline engine driven hydraulic sprayer. Includes one spray gun with adjustable nozzle, and 50ft of oil -resistant hose. Does not include spray tank.

3740-00-191-3677 SPRAYER, INSECTICIDE, MANUALLY CARRIED, PRESSURE TYPE. (B&G or equivalent). Two-gallon sprayer includes tank, 8-inch Extenda-ban® gun valve unit, 4-ft black hose, and adjustable nozzle tip assembly.

3740-00-641-4719 SPRAYER, INSECTICIDE, MANUALLY CARRIED, PRESSURE TYPE. Two-gallon, equipped with pressure gauge, hose, gun valve and wand, 4 separate nozzles and carrying strap. NOTE!! Older models that came without a gauge may be retrofitted with--gauge, pressure, pesticide sprayer, NSN 3740-01-332-8746 and a filter is also needed--filter, gauge, pesticide sprayer, NSN 4330-01-332-1639. Replacement parts (O-rings, etc.) may be ordered directly from the manufacturer. No stock numbers are assigned to these replacement parts.

3740-01-157-4000 SPRAYER AND DUSTER, BACK PACK, GASOLINE ENGINE DRIVEN (ECHO®MODEL DM-9). Dispenses dusts or emulsions, and can disperse granules and ULV mists with separate accessories (Granule-spreading nozzle: 3740-01-158-1728. ULV misting nozzle: 3740-01-156-9999).

V. SURVEILLANCE AND TRAPPING EQUIPMENT

7730-00-149-1196 DIPPER, ENTOMOLOGICAL, PLASTIC, WHITE, 112 OT., 14" LONG.
6230-00-264-8261 FLASHLIGHT, RIGHT ANGLE.
3740-00-252-3393 FLY SWATTER (package of 12).
6650-00-431-4375 MAGNIFIER, FOLDING, 14X.
3740-00-252-3384 MOUSE TRAP, SPRING (one dozen).

6640-00-435-6100	NET, INSECT.
3740-00-260-1398	RAT TRAP, SPRING (one dozen).
*3740-00-472-2743	TRAP, CAGE, ANIMAL, COLLAPSIBLE, SELF-CLOSING, 12" X 6" X 6".
3740-01-240-6170	TRAP, GLUE, RODENT (box of 24). Glueboard traps for entrapping domestic rats and mice.
*3740-01-106-0091	TRAP, MOSQUITO, LIGHT, BATTERY-POWERED. Also known as Solid State Army Miniature (SSAM) trap. Includes trap, collecting net, kill jar, some electrical hardware replacement parts, and holder for four D-cell batteries. Requires two BATTERY, GELCEL (6140-00-432-0490), and one each CHARGER, BATTERY (6130-00-629-7396), to enable recharging of one battery while the other battery is in use. When operated on D-cell batteries, requires four alkaline batteries (6135-00-935-7210) per 3-day usage.

*Medical items (Class VIII) that must be requisitioned through medical supply channels.

VI. SAFETY EQUIPMENT FOR PESTICIDE APPLICATORS

4240-00-759-3290	AURAL PROTECTOR, SOUND (for protection against sustained noise levels above 85db)
8430-00-241-2780 (size 10)	BOOTS, hip, black rubber
8430-00-241-2781 (size 11)	
8430-00-241-2782 (size 12)	
8430-00-262-8256 (size 9)	BOOTS, knee, rubber, 15 in. high
8430-00-262-8257 (size 10)	
8430-00-262-8258 (size 11)	
8430-00-262-8259 (size 12)	
8405-00-131-6507 (SM)	COVERALLS, LONG SLEEVE, OLIVE DRAB
8405-00-131-6506 (MED)	
8405-00-131-6509 (LG)	
8405-00-131-6510 (XLG)	
8415-01-012-9294 (size 9)	GLOVES, CHEMICAL AND OIL PROTECTIVE (Nitrile
8415-01-013-7382 (size 10)	gloves for protection against pesticides).
4240-00-190-6432	GOGGLES, INDUSTRIAL, NON-VENTED. (For protection of eyes from pesticide splashes, mists, and sprays).
4240-01-259-4573 (small, rubber)	KIT, RESPIRATOR, PESTICIDES, NIOSH/MSHA.
4240-01-259-4578 (med/lg, rubber)	Approval No. TC-23CA39.
4240-01-259-4584 (small, silicon)	Each kit contains: 3 ea. rubber dual cartridge, face

piece

4240-01-259-4590 (med/lg, silicon) 5 pr. #7287 cartridge retainers

20 ea. #7251 organic vapor cartridge

100 ea. #7257 pesticide prefilter

VII. PERSONAL PROTECTIVE EQUIPMENT AGAINST DISEASE VECTORS

7210-00-266-9736	INSECT BAR (NETTING), COT TYPE
7210-00-267-5641	POLES, INSECT BAR (for suspending insect bar)
8415-00-935-3130	HEAD NET, INSECT
8415-01-035-0846 (SM)	PARKA, FABRIC MESH, INSECT REPELLENT (DEET
8416-01-035-0847 (MED)	JACKET)
8415-01-035-0848 (LG)	

VIII. AIR-TRANSPORTABLE OVER PACK CONTAINERS

A. Some pesticides you might need in contingencies are provided in containers that do not meet published requirements for air transport. Also, acceptable original containers that have been opened, no longer qualify for air shipment. Of the contingency pesticides in Section II, the following items are not (or may not be) air-transportable:

1. INSECTICIDE, DIAZINON, 48% EC, 1 gal can, NSN 6840-00-782-3925 (At the manufacturer's discretion, item may be supplied to DoD in either of two types of cans. One type
is air-transportable, the other type is not).

2. INSECTICIDE, PYRETHRUM, 1.4%, OIL SOLUTION, 1 gal can, NSN 6840-00-400-2140 (This item falls in a “gray area” of the air transport regulations, and may be rejected for transport on military aircraft at the discretion of the aircraft loadmaster).

3. INSECT REPELLENT, CLOTHING AND PERSONAL, 75% DEET, 2oz bottle, NSN 6840-00-753-4963. (Because of the fire hazard, this item is not air-transportable in bulk quantities, i.e., boxes of 48 bottles. There are normally no restrictions against transporting individual bottles as part of personal gear).

B. Reusable overpack containers (cylindrical metal drums with resealable metal tops) are available for enabling these items to be transported by air.

1. One-gallon rectangular cans (nominally 10 in. x 6 in. x 4 in.) and the box containing 2 oz bottles of DEET, identified in paragraph A, may be overpacked in the following container:

DRUM, SHIPPING AND STORAGE, (12.9 in. ht. X 10.5 in. diam.) NSN

8110-00-254-5722.

2. A standard five-gallon drum (nominally 13.8 in. ht. x 10.9 in. diam.) may be overpacked in the following container:

DRUM, SHIPPING AND STORAGE (19.9 in. ht. x 15.4 in. diam.) NSN 8110-00-254-5716.

C. Transportation regulations also require that the pesticide container inside the overpack drum be cushioned on sides, top and bottom with vermiculite or other absorbent material. A suitable material is:

INSULATION, THERMAL (VERMICULITE, TYPE II), BAG, 4 CUBIC FT, NSN 5640-00-801-4176.

One bag of this material is adequate for over packing three standard 5-gallon drums, each in the larger overpack container, above. Approximately 7 one-gallon cans may be overpacked, each in the smaller container, with the material in one bag.

APPENDIX A

DILUTION FORMULAS

WEIGHT-VOLUME BASIS FOR DILUTING SOLID CONCENTRATES TO MAKE SUSPENSIONS OR SOLUTIONS

Formula 1.

$$W = \frac{8.34 x G x D}{C}$$

Where 8.34 = constant (Weight of one gallon of water)

W = Weight “lbs” concentrate

G = Gallons desired

C = % active ingredient in concentrate (expressed as a whole number. 80% = “80").

D = % active ingredient in finished spray (expressed as a whole number. 2% = “2").

Example: How many pounds of 80% carbaryl wettable powder will be used to obtain 100 gallons of a 2% spray?

Formula 1.

$$W = \frac{8.34 x G x D}{C} = \frac{3.34 x 100 x 2}{80} = 20.8 lbs.$$

$$G = \frac{W x C}{8.34 x D}$$

Formula 2.

Formula 3.

$$D = \frac{WxC}{8.34xG}$$

WEIGHT-WEIGHT OR VOLUME-VOLUME FOR DILUTING DUST IN DUST OR LIQUID IN LIQUID

Formula 4.

$$VC = \frac{VTxD}{C}$$

Where VC = Weight or volume of concentrate
VT= Total weight or volume of finished spray
C = % active ingredient in concentrate (expressed as a whole number. 80% = “80").
D = % active ingredient in finished spray (expressed as a whole number. 2% = “2").

Example: How much 95% concentrate will you use to obtain 200 gallons of 1% Malathion solution to be diluted with fuel oil?

Formula 4.

$$VC = \frac{VTxD}{C} = \frac{200x1}{95} = 2.1gal = 2gal + 13oz$$

Formula 5.

$$VT = \frac{VCxC}{D}$$

Formula 6.

$$D = \frac{VCxC}{VT}$$

"SAD COW FORMULA"

FOR DILUTING LIQUID CONCENTRATES WHICH ARE PREPARED ON THE BASIS OF POUNDS OF INSECTICIDE PER GALLON.

Example: Ten gallons of a 2 % emulsion are desired. The concentrate contains 8 lbs/gal active ingredient. How much liquid concentrate is required?

$$Q = \frac{SxAxD}{CxW} \qquad Q = \frac{2x10x8.34}{100x8} = \frac{166.8}{800} = 0.21 gals (26.88 oz)$$

Q = Quantity of concentrate required in gallons
S = Strength of percentage of active ingredient in finished spray
A = Amount of spray to be prepared in gallons
D = Density: weight of one gallon of diluent (usually water, 8.34 lb/gal)
C = Concentrate: percentage of active ingredient (constant), expressed as a whole number: 2% = "2"
W = Weight of actual insecticide (lb) in each gallon of concentrate

Most insecticides are now sold with the label indicating pounds of insecticide per gallon and percentage of toxic materials. In this case the weight to weight formula is modified so that the factor C is considered technical grade insecticide (100% active ingredient), and a factor W (pounds of insecticide per gallon) is added.

APPENDIX B

CALCULATING APPLICATION RATES

LINEAR APPLICATION

Known: Flow rate (gallons per hour); gallons required per linear mile.
To be found: Speed in miles per hour.

$$Speed = \frac{flowrate}{gallons/mile}$$

AREA APPLICATION

Known: Gallons per acre required; square feet in area to be treated; 43,560 square feet in one acre.
To be found: Gallons required.

$$Gallons = \frac{(sq.ft.) x (gals/acre)}{43{,}560}$$

Known: 43,560 square feet in one acre; flow rate per minute (gal); swath width (ft); gallons per acre required.
To be found: Speed in feet per minute.

$$Speed = \frac{(sq.ft.) x (gals/\text{min})}{swathwidth x (gals/acre)}$$

Known: 43,660 square feet in one acre; flow rate per minute (gal); swath width (ft); speed (ft per min).
To be found: Gallons per acre.

$$Gallons/acre = \frac{43{,}560 x (gals/\text{min})}{(swathwidth) x (speed)}$$

APPLY A CERTAIN PERCENT OF PESTICIDE

1. Solutions or Emulsions.

$$\text{Gal. of conc.} = \frac{\text{Gal. of Spray desired} \times \%\text{ desired} \times \text{Wt. of diluent}}{\text{lbs. of technical grade/gal.} \times 100}$$

2. Suspensions.

$$\text{Pounds of WP to add} = \frac{\text{Gal. of Spray desired} \times \%\text{ desired} \times \text{Wt. of diluent}}{\text{lbs. of technical grade/1lb.} \times 100}$$

3. Dust or Dry Baits.

$$\text{Pounds of conc. to add} = \frac{\text{lbs of material desired} \times \%\text{ desired}}{\%\text{ of concentrate}}$$

Note: All percentages are expressed as whole numbers: 5% = “5"

APPLY A CERTAIN NUMBER OF POUNDS OF ACTIVE INGREDIENT PER ACRE

1. Solutions or Emulsions

$$\text{Gallon of conc. to add} = \frac{\text{Recom. appl. rate (wt. in lbs)} \times \text{number of acres to treat}}{\text{lbs. technical grade per gallon}}$$

$$\text{Amt. of dilute spray needed} = \frac{\text{Machine output (gal./min.)} \times 500 \times \text{no. of acres to treat}}{\text{swath width} \times \text{MPH}}$$

2. Wettable Powders, Dusts, Granules, or Baits.

$$\text{Amt. of conc. to add} = \frac{\text{Recom. appl. rate (wt. in lbs)} \times 500 \times \text{number of acres to treat}}{\text{lbs. technical grade per lb. of conc}}$$

$$\text{Amt. of dilute spray needed} = \frac{\text{Machine output (lbs of gal./min.)} \times 500 \times \text{no. of acres to treat}}{\text{swath width} \times \text{MPH}}$$

3. If the amount of dilute pesticide needed exceeds the capacity of the tank you are using, the amount of concentrate to be added per tankful can be calculated by:

$$\text{Amt. of conc.} = \frac{\text{Amt. of conc. to add} \times \text{tank capacity}}{\text{Amt. of dilute pesticide needed}}$$

NOTE: The application rate and the amount of technical grade material per gallon must be in the same weight terms. That is, if the application rate is given in ounces of weight, you must convent it to pounds before using formulas 1 or 2. If the application rate is given in ounces, read the pesticide label carefully to make sure the ounces refer to weight (16 oz/lb) and not liquid volume (128 oz/gal).

APPENDIX C

CONVERSION FACTORS: U.S. AND METRIC UNITS

LENGTH

1 mile = 1.760 yards = 5.280 feet	=	1.6 kilometers = 1,609 meters
1 mile (nautical) = 6,080.2 feet	=	1.8 kilometers - 1.853 meters
0.621 miles = 1,093.6 yards	=	1 kilometer = 1,000 meters

1 yard = 3 feet = 36 inches	=	91.4 centimeters = 0.91 meters
1.094 yards = 3.28 feet = 39.37 inches	=	1 meter = 100 centimeters
1 foot = 12 inches	=	0.3048 meter = 30.48 centimeters
1 inch	=	2.54 centimeters
0.394 inch	=	1 centimeter
0.0394 inch	=	1 millimeter = 1,000 microns
0.000039 inch	=	0.001 millimeter = 1 micron

AREA

1 Square mile = 640 acres	=	259 hectares
0.39 square mile = 247 acres = 100 hectares	=	1 square kilometer
2.47 acres = 1 hectare	=	10.000 square meters
1 acre = 4,840 sq. yards = 43,560 sq. ft.	=	4,047 sq. meters = 0.405 hectare
1.2 sq. yards = 10.76 sq. ft. = 1,560 sq. in.	=	1 square meter
1 square yard = 9 square feet	=	0.84 square meter
1 square foot = 144 square inches	=	0.093 sq. meter = 930 sq. centimeters
1 square inch = 0.007 square foot	=	6.45 square centimeters

VOLUME

1 cubic foot	=	0.037 cubic yards - 28.32 liters
1 cubic inch	=	0.000579 cubic foot - 16.39 cubic centimeters = 16390 cubic millimeters

1.307 cubic yards	=	35.29 cubic feet - 1 cubic meter - 1,000 liters
1 cord of wood	=	128 cubic feet

LIQUID CAPACITY

1 U.S. Gallon = 231 cubic inches = 4 quarts	=	3.79 liters
0.26 U.S. gallon = 1.06 quart	=	1 liter = 1,000 milliliters
1 U.S. quart = 32 U.S. fluid ounces = 2 pints	=	0.9463 liter
1 pint = 16 fluid ounces = 2 cups	=	473.2 milliliters
1 tablespoon = 3 teaspoons = 0.5 U.S. fluid ozs.	=	14.8 milliliters
1 cup = 16 tablespoons = 8 fluid ounces	=	236.6 milliliters
1 fluid ounce = 2 tablespoons	=	29.57 milliliters

WEIGHT

0.035 ounce	=	1 gram = 1,000 milligrams
1 ounce = 1/16 pound	=	28.35 grams
1 grain = 1/7,000 pound	=	64.79 milligrams
1 pound = 16 ounces	=	453.6 grams
2.2 pounds = 35.37 ounces	=	1 kilogram = 1,000 grams
2,204 pounds	=	metric ton = 1,000 kilograms
1 U.S. ton (short) = 2,000 pounds	=	907 kilograms
1 U.S. ton (long) = 2,240 pounds	=	1,016 kilograms

TEMPERATURE SCALE

*C	0	5	10	15	20	25	30	35	40	45	50	55	60	80	100
**F	32	41	50	59	68	77	86	96	104	113	122	131	140	176	212

*C = degrees centigrade = 5/9 x (degrees Fahrenheit - 32)
**F = degrees Fahrenheit = 32 + (9/5 x degrees Centigrade)

APPENDIX D

MEDICAL ENTOMOLOGY POINTS OF CONTACT OVERSEAS

Country	**Unit/Address**	**Phone #**	**Service**
BRAZIL (Brasilia)	Commander USAMRU-BRASlLlA American Embassy-Brasilia APO Miami 34030	055-061-272-4548	USA
EGYPT (Cairo)	Commanding officer NAMRU-3 FPO New York 09527	820-727	USN
GERMANY (Landstuhl)	Commander 10th Medical Laboratory APO New York 09180	06371-86-8391/7211 DSN 433-1110 Ext. 8391	USA
GERMANY (Ramstein)	HQ USAFE/DEMO APO New York 09012-5001	06371-47-6846 DSN 480-684617306	USAF
HAWAII (Honolulu)	Tripler Army Medical Center Preventive Medicine Activity Honolulu, HI 96859-5000	(808) 433-6693/6731 DSN 433-6694/6731	USA
HAWAII (Pearl Harbor)	Officer-in-Charge NEPMU-6 Box 112 Pearl Harbor, HI 96860	(808)471-9505 DSN 430-0111 Ext. 471-9505	USN

INDONESIA (Jakarta)	Commanding officer NAMRU-2 Jakarta Detachment APO San Francisco 96356	62-21-41450	USN
ITALY (Naples)	Officer-in-Charge NEPMU-7 Box 41 FPO New York 09521	(081) 724-4468 DSN 625-4468	USN
JAPAN (Okinawa)	DET 1 AFOEHL/MEC APO San Francisco 96239-5000	DSN 634-0476	USAF
JAPAN (Sagami)	Commander USAPACEHEA-Japan APO San Francisco 96343	DSN 228-4112/4113	USA
JAPAN (Okinawa)	Commanding Officer U.S. Naval Hospital Box 244 ATTN: Occupational and Preventive Medicine Service FPO Seattle 98778	DSN 634-0105/0228	USN
KENYA (Nairobi)	Commander USAMRU-K Box 401 APO New York 09675	254-2-722541, Ext. 311	USA
KOREA (Yong San)	Commander LA Detachment 5th Preventive Medicine Unit APO San Francisco 96301	DSN 293-8087/8756	USA
PANAMA (Atlantic side) (Ft. Gulick)	Commander U.S. Army MEDDAC (Panama) Preventive Medicine Services (Atlantic Section - Ft. Gulick) Box 445 APO Miami 34008	83-4701/4774 DSN 283-4701	USA
PANAMA (Pacific side) (Ft Clayton)	Commander U.S. Army MEDDAC (Panama) Preventive Medicine Services (Pacific Section) APO Miami 34004	DSN 313-285-5602	USA

PERU (Lima)	Officer-in-Charge NAMRlD Lima, Peru APO Miami 34031	011-51-14-52-96-62	USN
PHILIPPINES (Subic Bay)	Officer-in-Charge Branch Clinic, Box 32 U.S. Naval Station APO San Francisco 96651-1612	DSN 884-3669/3730	USN
THAILAND (Bangkok)	Commander U.S. Army Medical Component AFRIMS APO San Francisco 96346	66-2-282-8141 Ext. 283	USA

APPENDIX E

DOD REPELLENT SYSTEM

The best strategy for defense against disease-bearing arthropods includes the application of extended-duration DEET lotion to exposed skin, coupled with the application of permethrin to the field uniform. When used with a properly worn uniform, this system will provide nearly complete protection from arthropod-borne diseases.

Studies have shown these newly developed repellents provide military personnel with unprecedented levels of protection. An aerosol formulation of permethrin (NSN 6840-01-278-1336) can be applied to the uniform according to label directions but not to the skin. This will provide both repellent and insecticidal properties to the uniform material which will be retained through several washings.

A new extended formulation lotion of diethyl-m-toluamide (DEET) (NSN 6840-01-284-3982) has been developed to replace the 2 oz. bottles of 75% DEET in alcohol. The new formulation contains 33% active ingredient. It is less irritating to the skin, has less odor, and is generally more acceptable to the user. Combined use of extended duration DEET on exposed skin and permethrin on uniform items has been demonstrated in laboratory and field studies to provide nearly 100% protection against a variety of blood-sucking arthropods. In addition permethrin may be applied to bednets, tentage and other field items as appropriate.

APPENDIX F

CONTINGENCY CAPABILITY OF AIR FORCE LARGE AREA AERIAL SPRAY FOR DNBI REDUCTION

Large area aerial spray (LAAS) capability has a long history of successful military missions that date back to World War ll. Current Air Force 0-130 based assets provide unequaled capability to control 90-95% of disease vectors while covering an area of 2 square miles per minute of application. Reference (a) lists 83 diseases of military importance with 2/3 of them (53) being vectored or carried by insects and other arthropods. High risk to these vector-borne
diseases, especially malaria and dengue fever, makes them potential war stoppers in large areas of the world (references b & c). Medical planners estimating worst case scenarios for military operations in semi-tropical and tropical regions should plan for the deployment of Air Force LAAS to provide maximum support for prevention of vector-borne disease in accordance with references (d) and (e).

Operational Requirements

Numerous situations can develop in an operational contingency which would make LAAS the method of choice for vector control operations:

- ♦ Environmental conditions (i.e. flooding or limited road access) could make ground control methods unfeasible or too slow to effect disease control over a wide area.

- ♦ Disease epidemics or potential outbreaks require swift control of vectors to break the disease cycle and stop the epidemic.

- ♦ Post conflict ground vector control operations may remain too hazardous in many areas until mines and booby traps can be cleared.

- ♦ Natural disasters such as hurricanes and earthquakes, create humanitarian relief situations where LAAS could prevent the spread of vector-borne disease or stop an ongoing epidemic.

Concept of Operation

Two early morning or late afternoon sorties each day using two aircraft at 100-300 AGL can effectively control 90-95% of disease vectors and pest insects at the rate of 2 square miles per minute.

Normal swath widths of 1.000 - 3,000 feet over secure areas can treat 2 square miles per minute.

Over non-secure areas, stand-off swath widths of up to 2.5 miles result in coverage of 20 square miles per minute by controlled drift.

Four new modular aerial spray systems (MASS) have been delivered with 2 more scheduled by end of FY 91.

Two C-130 aircraft are outfitted to accept the MASS.

Two aircrews and two entomologists are currently available to conduct spray missions.

Potential areas for use of C-130 aerial spray are:

- Troops and equipment staging areas for return to CONUS, including a buffer area to reduce disease vector reinfestations.

- In-theater troop concentration sites with potential vector-borne disease problems within the combat zone and communication zone of the theater. Refugee/EPW holding areas.

- Airfields.

Requests for LAAS should include:

- Location of spray area with map coordinates, or if possible, boundaries marked on a map.

- Spray timing requested (date and time).

- Acreage to be sprayed including a buffer zone.
- Point of contact, with phone number if possible.

- Target disease vectors and pests.

Validated requirements for this support flow through the Major Component Command Surgeon's office to the Office of the Surgeon for the CINC. Direct liaison with aerial spray personnel may be authorized at the discretion of the respective surgeons.

Information must be provided to all unit commanders and ground forces regarding the purpose and timing of the spray missions.

CONUS POC's are:

- Air Force Reserve 356th Tactical Air Squadron, Aerial Spray Branch Lt Col Terry

Biery at DSN 950-3106/3116, Commercial (614)492-3106/3116, Fax 4325

- Armed Forces Pest Management Board, Contingency Liaison Officer, DSN 295-7476, Commercial (301) 295-7476, Fax 7473.

References:

a. Handbook of Diseases of Military Importance, Defense Intelligence Agency, Pub. DST-1810H-001-8.

b. World Malaria Situation, World Health Organization, Weekly Epidem. Record, 22 Jun 90.

c. Halstead, S.B., Global Epidemiology of Dengue Hemorrhagic Fever, S.E. Asian J. Trop. Med. Pub. Health, Dec 1990.

d. DoD lNST 4150.7 Pest Management.

e. AFR-91-22, Aerial Spray.

APPENDIX G

PEST MANAGEMENT INFORMATION, COUNTRY SPECIFIC RESOURCES

The Defense Pest Management information Analysis Center (DPMIAC) publishes Disease Vector Ecology Profiles (DVEPs); concise summaries of the vector-borne diseases that occur in specific countries, emphasizing essential epidemiology, vector bionomics, behavior, and pesticide resistance. DPMIAC currently has DVEPs complete or essentially complete on 67 countries.

DVEPs are reviews of relevant entomological and arthropod-borne disease information for, among others, medical planners and military entomologists. Compiled from unclassified scientific literature, they are intended to provide a historical profile of arthropod-borne disease epidemiology in the recent past for selected geographical areas, and should be supplemented with recent information on foreign public health status and medical developments. Component medical department activities may have updated regional information for their areas of responsibility. Current disease risk assessments, additional information on parasitic and
communicable diseases, and other medical intelligence can be obtained from the Armed Forces Medical Intelligence Center (AFMIC), Fort Detrick, Frederick, MD 21701(301-663-7511, or DSN 343-7511).

Additional information can be obtained from the Navy Preventive Medicine

Information System (NAPMIS) which maintains up-to-date Disease Risk Assessment Profiles (DISRAPs) and Disease Vector Risk Assessment Profiles (VECTRAPs) on most countries of the world. DISRAPs and VECTRAPs can be obtained by contacting the Navy Environmental Health Center (NEHC) (804-444-7575 extension 456, DSN 564-7575 extension 456).

DVEPs are designed to complement documents obtained from AFMIC and NEHC. In addition to DVEPs, DPMIAC can provide bibliographic literature searches of its extensive, worldwide databases on pest management, medical entomology, and pesticide toxicology. DPMIAC also conducts supplementary online computer searches of other biomedical databases for the most recently published information. Request services in writing to DPMIAC, AFPMB,
Forest Glen Section, WRAMC, Washington, D.C. 20307- 5001, by phone (24 hours/day) (301-427-5365, DSN 291-5365) or fax (5045).